

# Financing the future of mobility

Auto finance in the evolving transportation ecosystem



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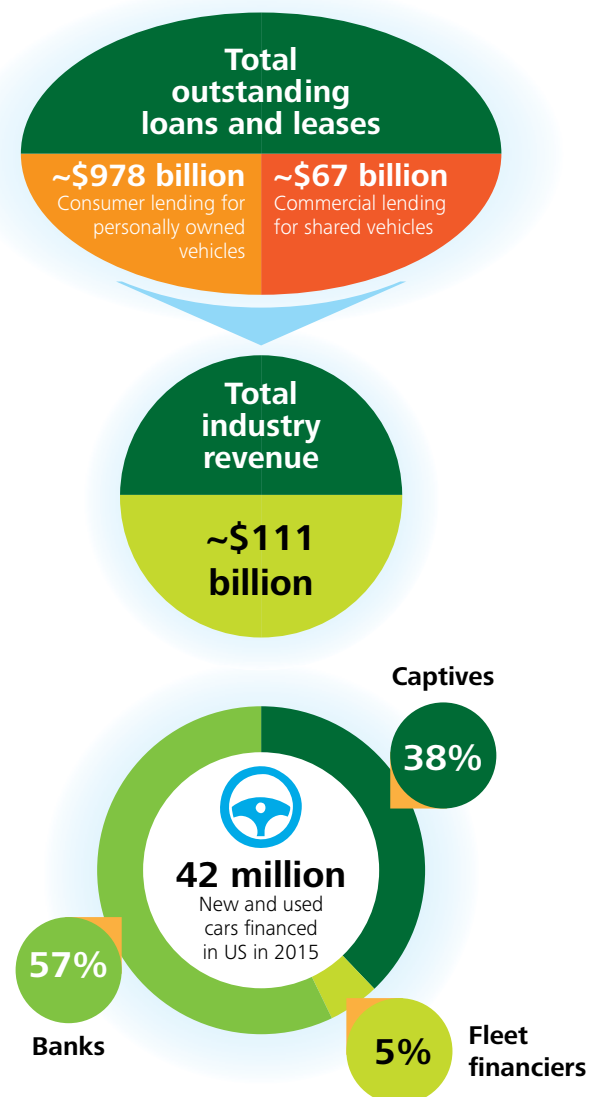
# Introduction

**F**EW consumer-facing businesses are as dependent on well-functioning and widely available financing as the automotive industry.<sup>1</sup> Roughly \$500 billion in new loans and leases are originated annually, and 86 percent of new car purchases and 55 percent of used ones rely on borrowed money, with banks, captives, and fleet financiers all playing important roles (figure 1).<sup>2</sup> Collectively, the US auto finance industry held roughly \$1 trillion in outstanding loans and leases in 2015, translating to nearly \$111 billion in revenue.<sup>3</sup>

The well-established role of auto finance will be deeply challenged in the coming years as the extended global automotive industry evolves into a new mobility ecosystem. A series of converging social and technological forces, from advanced powertrains to shifting consumer preferences and the emergence of autonomous vehicles, will reshape the way people and goods move about in the coming years. Most notably for auto financing, the rise of shared access to vehicles and drop in the number of consumer purchases could dramatically alter the number and size of loans—and who needs them.<sup>4</sup> Customers will increasingly be businesses in addition to individual consumers, and overall loan volume—and its associated revenue—could decline dramatically in the long run.<sup>5</sup>

To thrive in the emerging mobility ecosystem, auto finance companies will need to rethink their traditional value chain, from sales

Figure 1. The US auto finance market, 2015



Source: Experian; IBISWorld; Deloitte analysis.

Graphic: Deloitte University Press | DUPress.com

A series of converging social and technological forces, from advanced powertrains to shifting consumer preferences and the emergence of autonomous vehicles, will reshape the way people and goods move about in the coming years.

and origination to servicing and asset disposition. The scope of the required transformation will vary across lenders. Large diversified banks may have many of the needed capabilities already; their challenge will be imparting knowledge across business units and managing the rebalancing of volume between consumer and commercial auto lending. By contrast, captives focused primarily on dealer-driven loans to individuals will need to explore developing new business models to serve tomorrow's larger pool of commercial borrowers.

For finance companies grappling with these changes, our hope is to share insights derived from our work on the future of mobility and to commence an ongoing dialogue around the evolution under way, its implications for incumbents and disrupters, and the sources of new value creation.<sup>6</sup> In short, we seek to help key stakeholders explore “where to play” and “how to win” in the evolving mobility ecosystem. And we believe there are concrete steps auto financiers can take *today* to prepare for the future.

# The future of mobility

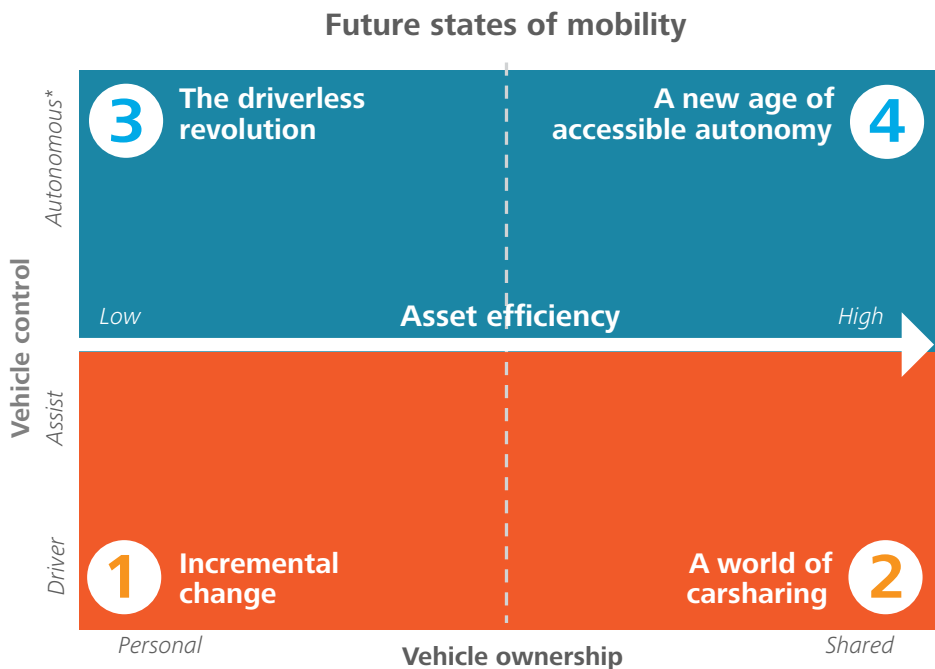
**T**HE way people and goods move about is on the cusp of a fundamental transformation.<sup>7</sup> Advances in powertrains and materials, increasing vehicle connectivity, shifting consumer preferences, and the emergence and adoption of self-driving vehicles will ultimately give rise to a new mobility ecosystem. The

contours of that ecosystem are likely to be determined by two key factors: the degree to which mobility is personally owned or shared, and whether vehicles remain in human control or are fully autonomous. The combination of those factors yields four potential future states of mobility (figure 2).

**Figure 2. The future states of mobility**

Extent to which autonomous vehicle technologies become pervasive:

- Depends upon several key factors as catalysts or deterrents—e.g., technology, regulation, social acceptance
- Vehicle technologies will increasingly become "smart"; the human-machine interface shifts toward greater machine control



Extent to which vehicles are personally owned or shared:

- Depends upon personal preferences and economics
- Higher degree of shared ownership increases system-wide asset efficiency

*\*Fully autonomous drive means that the vehicle's central processing unit has full responsibility for controlling its operation and is inherently different from the most advanced form of driver assist. It is demarcated in the figure above with a clear dividing line (an "equator").*  
Source: Deloitte Future of Mobility analysis.

- In *future state 1* (Incremental change), vehicles remain personally owned and driver-driven. Private ownership remains the norm, with consumers opting for the privacy, flexibility, security, and convenience that come with owning their own vehicles. Importantly, while incorporating driver-assist technologies, this vision assumes that fully autonomous drive won't become widely available anytime soon.
- *Future state 2* (A world of carsharing) anticipates continued growth of shared access to vehicles through taxis, limos, rental cars, ridesharing, and carsharing. Economic scale and increased competition drive the expansion of shared vehicle services into new geographic territories and more specialized customer segments. Here, passengers more heavily value the convenience of point-to-point transportation created through ridesharing and carsharing. Plus, the system offers options for non-drivers such as seniors, low-income families, and minors without licenses.
- In *future state 3* (The driverless revolution), autonomous drive technology proves to be viable, safe, convenient, and economical, yet private ownership continues to prevail. Individuals seek driverless functionality

for its safety and other potential benefits but continue to own cars for many of the same reasons they did before the advent of autonomous drive. They might invest in even more expensive vehicles as a new era of customization dawns and it becomes appealing to use vehicles tailored for specific occasions and circumstances.

- *Future state 4* (A new era of accessible autonomy) anticipates a convergence of both the autonomous and vehicle-sharing trends. In this future, mobility management companies offer a range of passenger experiences to meet widely varied needs at differentiated price points. The earliest, most avid adopters seem likely to be urban commuters, but as smart infrastructure and driver usage expand, fleets of autonomous shared vehicles could spread to densely populated suburbs and beyond.<sup>8</sup>

The transition from future state 1 will not happen uniformly or linearly. Because mobility needs vary with demography and geography, and because technology and social attitudes will progress unevenly, the four future states will likely exist in parallel for the foreseeable future. For stakeholders, that means preparing to operate in a much more complex, multifaceted mobility ecosystem for the foreseeable future.



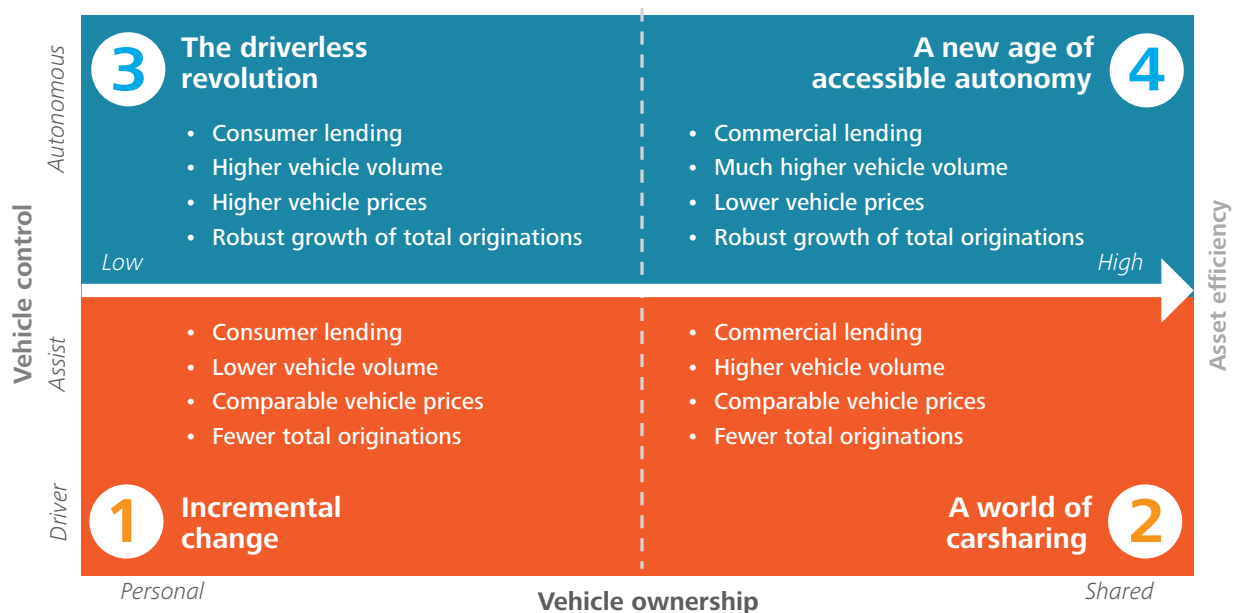
# Auto finance in the future of mobility

**T**HE way auto finance will operate to serve customer needs in each future state will vary as well (figure 3).<sup>9</sup> In some markets at some points in time, lenders will continue to make traditional loans and leases to individual consumers. But for other segments, the model looks very different, emphasizing business-to-business commercial lending with tighter margins and the possibility of much lower new vehicle and residual values.

## Personally owned vehicles (future states 1 and 3)

Future state 1 looks much like today's extended automotive industry and represents only an incremental change. Vehicles will be more intelligent, but they will remain personally owned and will likely continue to be sold through dealers. As a result, auto finance companies serving this part of the market will

Figure 3. Auto finance in the future of mobility



Note: Changes are relative to today's market.  
Source: Deloitte analysis.

see relatively little impact to their fundamental operating model—and only minor operational or go-to market changes required to compete. Financing will continue to be offered to individual customers. As long as dealers continue to stock inventory, floor plan lending will continue.

In future state 3, the emergence and adoption of driverless vehicles, individually owned and computer-operated, creates a driverless revolution. Without the need to accommodate a human driver, the car's cabin can become a space for work or leisure, highly customized to the individual consumer's needs.<sup>10</sup> For those providing financing, the change may be less dramatic. Because automakers continue to sell or lease vehicles to individuals, much of the traditional financing model may remain in place. Individual loan size may increase if some two-car families downsize to one more efficient—but also more luxurious—autonomous car. (That said, higher sticker prices are unlikely to fully offset the decline in sales volume as many customers shift to shared mobility and reduce their level of personal car ownership. See discussion of shared mobility below.) Floor plan financing could also diminish as dealers shift from stock-on-hand to build-to-order models focused on helping customers design more customized autonomous vehicles, particularly as those models become more modular.<sup>11</sup>

### Shared mobility (future states 2 and 4)

Many of the core elements of auto finance for shared, driver-driven vehicles (future state

2) are already in place. Well-established fleet finance companies are serving the needs of taxi, limousine, and rental car fleets.<sup>12</sup> But a sea change occurs for auto finance in future state 4, as autonomous shared mobility becomes a reality. The finance model will be business-to-business, focused on fleet owners. Auto finance companies can provide funding not only for the purchase of autonomous fleets but for their maintenance and other shared vehicle infrastructure, such as fueling or recharging stations, insurance, and parking. A number of dealers, particularly national ones, may decide

to transform their businesses to become the mobility management providers that will likely dominate future state 4, competing with fleet operators, ridesharing, and rental car companies.<sup>13</sup> This could open up a sizable new frontier for auto finance companies. There will also be a need to accept and process payments related to services associated with shared mobility, including paying for the ride itself and any ancillary services (such as enter-

tainment) during the trip.

The challenges this shift poses for vehicle finance companies are significant. Shared autonomous vehicles, particularly in densely populated urban areas, are likely to be predominantly utilitarian. That means lower per-unit prices and residual values, so much so that auto lending may look more like “small ticket” financing for things such as commercial office equipment or lower-priced medical equipment—a space with a large number of established players that could challenge financiers. In addition, dealing with sophisticated commercial borrowers financing large volumes could mean tighter margins.

Our analysis suggests that nearly 35 percent of the total auto finance market could ultimately be in commercial, versus consumer, transactions.

To better understand the magnitude of the coming change, we used data on the current auto finance market and assumptions about how quickly and widely each of the future states will be adopted and the corresponding impact on vehicle sales, types, and values. From there, we derived forecasts of the size and types of vehicle financing that will be required in the future of mobility. While our estimates are preliminary and, we think, conservative, they suggest that the four future visions will combine to remake the auto finance landscape.

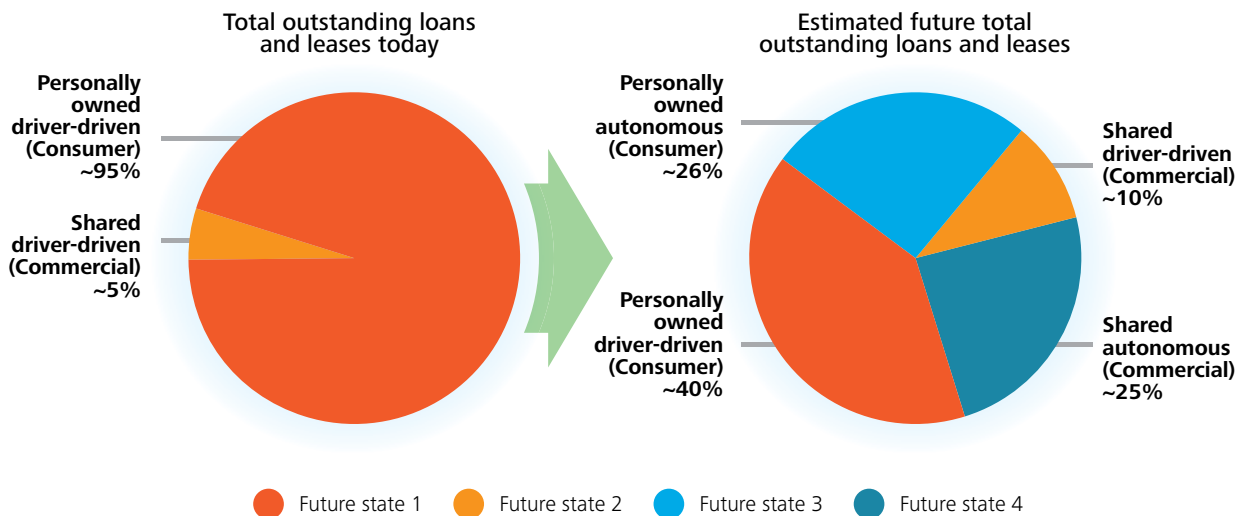
Today’s market is primarily driven by individuals buying cars: It is a dealer-driven, point-of-sale, consumer-focused business (figure 4). But as people increasingly forgo purchasing a vehicle and opt instead to access on-demand mobility, the auto finance business will shift its focus toward providing financing for the commercial owners of shared vehicle fleets. Our analysis suggests that nearly 35 percent of the total auto finance market could ultimately be in commercial, versus consumer, transactions, and that the overall size of the market could shrink substantially from today’s \$1 trillion—which means that a significant portion of auto financiers’ \$110 billion in annual revenue could also be at risk.<sup>15</sup>

### THE USED CAR MARKET

Dealers sold more than 38 million used cars in 2015, and 55 percent of those purchases relied on some form of financing,<sup>14</sup> but the changes brought about by the future of mobility will ultimately ripple through the used car market as well. As autonomous technology is adopted in more and more vehicles, there could arrive a tipping point at which the resale value of less advanced, driver-driven cars could drop precipitously. And if shared autonomous fleets are populated by inexpensive, utilitarian electric “pods” with limited service life, that could mean effectively zero used cars being generated in future state 4—a dramatic decline in supply. That said, more expensive personally owned autonomous vehicles could mean larger loans when they hit the used market.

Because the four future states will coexist, auto finance companies need to be prepared to serve a diverse range of customers who may be purchasing and consuming transportation in dramatically different ways—or to specialize and resize their business for a significantly smaller overall market.

Figure 4. Estimated distribution of auto financing in the future of mobility<sup>16</sup>



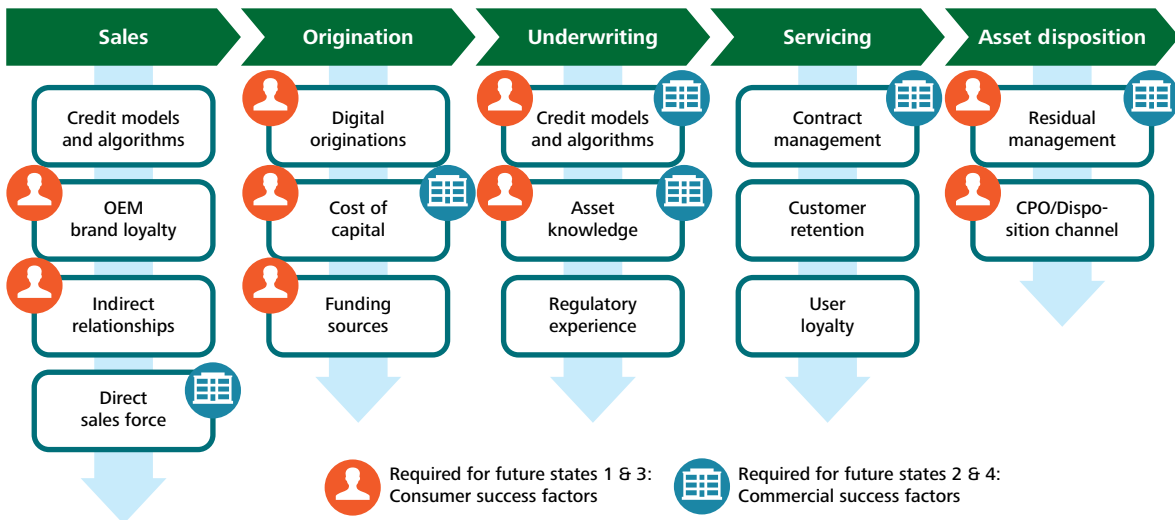
Note: Percentages may not sum to 100% due to rounding.  
Source: Deloitte preliminary analysis.

# Preparing for the future of mobility

**F**OR all the turmoil, the fundamental steps of the auto finance value chain will remain in the future of mobility (figure 5). Loans and leases will still need to be originated, underwritten, and sold, and assets will need to be disposed of. And the financial services industry is large, sophisticated, and—with the emergence of marketplace lending and other disruptive trends—increasingly dynamic and innovative, which means that the financing products already or will soon exist to address the dramatic changes we anticipate in the

future of mobility. What is required to *execute* each one of those steps and to create those products will likely deviate significantly from the capabilities of many of today’s auto finance players. Companies will need to: determine which segment or segments of the future mobility ecosystem they will seek to serve; evaluate their current operations, practices, and functional capabilities; and determine what new skills and resources they will need to compete successfully.

Figure 5. Auto financing value chain and required capabilities



The future of mobility for auto finance companies will be about rebalancing the business, dialing back capabilities and investment in consumer markets and ramping it up, along with associated capabilities, in commercial ones. That implies differing levels of effort for different auto finance players. For large diversified banks, it may “simply” be a matter of shifting business from one division (auto lending) to another (equipment lending). For captives heavily focused on consumer-based auto lending and leasing, the need for transformative change will be greater as they explore entirely new business models and capabilities as required for commercial finance.

## Sales

The first step in the auto finance value chain is finding and connecting with customers who need to borrow money to make their purchase. Today, that primarily happens indirectly, via dealerships; roughly 80 percent of cars are financed via a dealer.<sup>17</sup> Captives’ relationships with dealers and OEMs are critical for access to customers and for loan/lease subvention.<sup>18</sup> Both indirect relationships and the ability to leverage customer loyalty to particular carmakers are unique sources of strength for captives, and they will continue to be important foundations of competitive advantage in the market for personally owned vehicles, whether driver-driven or autonomous, even as auto retailers adapt their own business models to the future of mobility.<sup>19</sup>

For shared vehicles in future states 2 and 4, the financing model is business-to-business and more closely approximates today’s rental car fleet or equipment financing markets (such as construction, trucking, machinery, or office equipment). Sales are driven by individual relationships between the commercial customer and financier (typically a commercial bank, fleet finance company, or specialty lender). Unlike the dealer-centric approach to auto finance, this is frequently a “feet on the street” direct sales approach, with many financial institutions providing dedicated

sales managers to their larger business clients. Loyalty to the equipment maker plays only a modest role, although there is precedent for vertically integrated companies providing end-to-end offerings, supplying, financing, and servicing the product.<sup>20</sup> This suggests an opportunity for captives, although it would require building new sales and relationship management capabilities and challenging incumbents that have a well-established model for equipment loans and leases.

## Origination

Historically, customers have rarely relished the process of initiating a loan, with its reams of paperwork and long wait times at the dealership. That’s already beginning to change, as auto retailers look to adopt customer-centric omnichannel retail models<sup>21</sup> and new entrants, particularly from fintech, create a faster, simpler, and smoother lending experience.<sup>22</sup> By the time customers are purchasing their own autonomous vehicles in future state 3, the dealer interaction will likely have shifted to a highly tailored showroom experience,<sup>23</sup> and auto finance companies will need to offer an origination process to match, with near-instantaneous mobile loan generation and approval enabled by secure digital authentication.

Cost of capital will remain an important driver of lender profitability in all future states, but it becomes particularly vital in future states 2 and 4’s commercial market. Because auto finance companies will be serving sophisticated fleet operators, many with sufficient scale and leverage to command price concessions, margins will narrow relative to today’s retail loans and may have a risk profile that requires more capital. Financiers with a relatively low cost of capital or those able to garner subvention from the OEMs will be better positioned to remain profitable. In practical terms, that means banks that can draw on their own low-cost deposits will likely have an advantage. Captives, which often borrow relatively expensive commercial paper, would be most likely to get a margin subsidy from the equipment

manufacturer if it is necessary to maintain the demand for vehicles.<sup>24</sup> Securitization's role in supporting the cost structure and lending capacity for consumer-facing finance will continue to be critical, particularly for captives. Securitization has been uncommon in commercial lending, but as disruption from marketplace lenders and other forces change the industry, that too could change.

## Underwriting

In parallel with origination, determining how much to lend and the associated risk will also change in the new mobility ecosystem. Many of the established processes for assigning creditworthiness in consumer lending will remain in future states 1 and 3, but the ability to leverage the broadest sets of data and the most accurate and efficient algorithms will become more plentiful and more important. The trend of proliferating sensors generating data on everything from driving patterns to health to work habits<sup>25</sup> will continue, and auto finance companies with the most complete picture of a potential borrower will be better able to control lending risk and more accurately price their products.

Likewise, knowledge of the asset—a strength for today's captives—will continue to figure prominently in personally owned auto lending in the future. With increased connectivity, the lender's understanding of any particular vehicle will become increasingly comprehensive; it is feasible that in the near future an auto finance company could know exactly where, when, and how a car has been driven since it first rolled off the assembly line. Many of the same trends will apply to the commercial lending that will predominate in future states 2 and 4, but with the added challenge of having to evaluate complex businesses and entire fleets of vehicles. All of this will require auto finance companies to develop ever more robust data management and analysis capabilities to enhance credit models and underwriting standards.

## Servicing

Today there are relatively few opportunities for differentiation around loan and lease servicing for the personally owned auto market, and we anticipate that trend will continue. All of the auto finance players can collect payments from their borrowers and have an established collections process for those who are delinquent. The frequent interactions with the customer are largely automated, and financiers could do more to foster that relationship, but because indirect channels will remain the primary outlets for loan generation in future states 1 and 3, there is relatively little upside in doing so.

In future states 2 and 4, contract management and monitoring take on increasing importance. Lenders will need to keep a close tab on the condition and usage of vehicle fleets—a complex and time-consuming task. Thankfully, the data generated by connected and autonomous vehicles can make this markedly easier: Auto finance companies may be able to monitor the location and status of every vehicle on their books in real time. Of course, as in underwriting, all of that necessitates that auto finance companies build the capabilities to store, analyze, and act on the reams of data emerging from the new mobility ecosystem.

## Asset disposition

The ability to value a vehicle is a key differentiator in the contemporary auto finance market, enabling lenders to better price their products and realize greater profits. But just as smarter and more-connected vehicles will affect underwriting and servicing, the increased volume and variety of data will also erode auto finance companies' ability to differentiate based on superior asset knowledge, particularly in future state 3. As the state of the vehicle becomes more transparent and knowable in real time, residual management becomes easier—but also commoditized. What will remain important for the personally owned, consumer market is the ability to

dispose of assets efficiently through markets that provide clearinghouses for buyers and sellers. Here, the captives' organized outlet via dealerships will remain a competitive advantage relative to banks and other lenders.

Commercial asset disposition in future state 2 will be similar to today, with vehicles heavily depreciated and frequently sold through auctions. By contrast, future state 4 could fundamentally differ from today's used car market. The key unknown will be how to establish values for shared autonomous vehicles, which could be quite utilitarian and inexpensive. Rental fleet and lease residuals typically assume that a vehicle will have a useful life after an initial contract. But shared electric or fuel-cell powered "pods" may be little more than scrap after their initial period of service—much like a well-used taxicab today. For auto fleet financing, this could mean a lending risk model closer to asset-backed inventory

lending, which assumes a constantly replenishing stock of goods for collateral. Or, given these vehicles' modular nature, they may be kept in service through frequent replacement of electric motors on wheels and regenerative braking; battery packs can be pulled out and reused, potentially creating a larger market in reusing components.

In any scenario, the speed of technological innovation will also play a role. If key components, like batteries or sensors, quickly become obsolete, residual values will drop dramatically (but will also be easier to manage since they require shorter forecasts). Answers to these questions will become clearer as the market matures, but there will likely be a lengthy transition period in which auto finance companies have the space to make—and lose—money depending on how they choose to value shared autonomous vehicles.

# Emerging opportunities

**L**IKE all transformative changes, the future of mobility will create winners and losers, changing the core of the auto finance industry while also generating new openings. For those who decide to maintain their current business models, there will continue to be a role for traditional loans and leases made to individual consumers (future states 1 and 3), although likely at significantly lower volumes as the auto finance market shifts to put greater emphasis on commercial lending. Those already in the fleet financing space, or those willing to enter it (future states 2 and 4), have the opportunity to establish themselves in a rapidly growing market as shared mobility becomes the norm for a larger swath of the population. And there are entirely new opportunities for auto finance companies in the future of mobility—if they are agile enough to capitalize on them.

- **Payments processing.** Auto finance companies are already processing borrowers' loan payments, but as shared mobility and autonomous vehicles become more widely adopted, consumers will require the ability to rapidly and seamlessly pay for a wide range of goods and services: dynamic road pricing, information and entertainment consumed in transit, and the ride itself. The opportunity could be sizable, but auto finance companies that vie for this business are likely to face stiff competition from players with already established digital payments platforms and credit card providers, and the commercial banks that connect these platforms to customers. To overcome these handicaps, captives might consider leveraging their dealer relationships to sign

up customers for a broader, ongoing payment platform at the point of sale, although that approach will be limited to situations where vehicles remain personally owned.

- **Monetizing the “digital exhaust.”** There will be significant value that can be derived from the data generated by both the vehicle and the passengers in the future of mobility. But as with payments processing, auto finance companies are likely to confront an uphill battle with automakers, autonomous operating system manufacturers, mobility management providers, telecom companies, social media platforms, content providers, and others for access and ownership of these data. Auto finance companies might consider including data access clauses into loan and lease agreements, or offering incentives for borrowers who agree to provide the lender with their data.<sup>26</sup> That data could be analyzed to optimize auto lenders' own operations, but more importantly it could be offered to third parties interested in, for example, targeted advertising.
- **Dealer modernization.** In the medium run, auto finance companies have an opportunity to finance the transformation of dealerships looking to compete in future state 3, in which the model will be much more build-to-order and dealer facilities will be more customer-friendly. They might also finance the infrastructure needed for shared autonomous vehicles in future state 4, such as storage facilities for fleets during low-demand periods.



# Conclusion: New levels of engagement

**T**HE extended automotive industry is undergoing a profound and disruptive transformation propelling the emergence of a new mobility ecosystem. As an indispensable player in the industry, auto finance companies will also need to transform their business models to align with the new sources of growth and value creation. As with most great transformations, the future of mobility creates opportunities and challenges and will result in winners and losers. Change is likely to come more quickly than many imagine. The stakeholders in today's industry have a window of opportunity to transform and adapt, creating a sustainable and enduring advantage.

Those that achieve the expected results will engage with customers—whether consumers or businesses—on more levels and via more channels than they do today. They will deploy

capabilities, whether in-house or in collaboration with financial technology partners, to harness the diverse data that will infuse the mobility ecosystem. They will support dealers' short-term financing needs as they undergo their own transformations. And they will develop products that enable new customer experiences and mobility services.

The future of mobility is likely to change auto finance irrevocably. To be ready, companies need to begin asking themselves the hard questions today: What role do we aspire to in the mobility ecosystem? What abilities and assets do we need to succeed? How do we transform our business? In answering, companies will have taken the first step on a long, perilous, prosperous journey.



# Endnotes

1. A full exploration of the relationships between auto finance companies and other industry stakeholders (such as automakers and dealers) is beyond the scope of this paper, but see, for example, Wilko Schulz-Mahlendorf's working paper *Safety net or crutch? Quantifying carmaker reliance on captive finance*, November 23, 2012, [www.econ.ucla.edu/jobmarket/2012/schulz-mahlendorfpaper.pdf](http://www.econ.ucla.edu/jobmarket/2012/schulz-mahlendorfpaper.pdf).
2. Molly Stewart, "Auto finance outstandings top record \$900 billion," *Auto Finance News*, May 13, 2015, [www.autofinancenews.net/auto-finance-outstandings-top-record-900-billion/](http://www.autofinancenews.net/auto-finance-outstandings-top-record-900-billion/); *State of the automotive finance market, fourth quarter 2015*, Experian Automotive, [www.experian.com/assets/automotive/quarterly-webinars/experian-auto-2015-q4.pdf](http://www.experian.com/assets/automotive/quarterly-webinars/experian-auto-2015-q4.pdf).
3. Experian, "Open automotive loans top \$1 trillion dollars while lease balances skyrocket," May 19, 2016, [www.experianplc.com/media/news/2016/q1-2016-safm-part-1/](http://www.experianplc.com/media/news/2016/q1-2016-safm-part-1/); IBISWorld, "Key statistics," *Auto leasing, loans, and sales financing US industry report*, accessed May 23, 2016.
4. For convenience and unless otherwise specified, we generally use "loans" to refer to both loans and leases.
5. Based on Deloitte analysis. See subsequent sections and note 15 for a more detailed explanation of our approach.
6. See our entire *Future of Mobility* collection on DU Press at <http://dupress.com/collection/future-of-mobility/>.
7. Scott Corwin, Joe Vitale, Eamonn Kelly, and Elizabeth Cathles, *The future of mobility*, Deloitte University Press, September 24, 2015, <http://dupress.com/articles/future-of-mobility-transportation-technology/>.
8. Ibid.
9. This paper focuses exclusively on how the future of mobility, in particular the rise of car-sharing and ridesharing and the emergence of autonomous vehicles, will impact auto finance. Other important trends, such as new disruptive entrants, peer-to-peer and marketplace lending, shifting regulation, and the Internet of Things, will also have major implications for auto finance companies, but they are beyond this article's scope. For more on the IoT, see our collection on DU Press at <http://dupress.com/collection/internet-of-things>.
10. Andrew Dinsdale, Philipp Willigmann, Scott Corwin, and Jeff Glueck, *The future of auto retailing: Preparing for the evolving mobility ecosystem*, Deloitte University Press, March 15, 2016, <http://dupress.com/articles/automotive-retail-industry-mobility-ecosystems/?icid=hp:ft:01>.
11. Ibid.
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13. Corwin, Vitale, Kelly, and Cathles, *The future of mobility*.
14. Edmunds.com, *2015 used vehicle market report*, February 24, 2016, <http://static.edmunds-media.com/unversioned/img/industry-center/analysis/2015-used-market-report-new.pdf>; Experian, "Majority of consumers rely on financing as loan amounts for new vehicles skyrocket to reach another all-time high," March 4, 2015, [www.experianplc.com/media/news/2015/q4-2014-safm-part-2/](http://www.experianplc.com/media/news/2015/q4-2014-safm-part-2/).
15. To estimate future total vehicle sales, we used data on current passenger miles for urban, suburban, and rural areas and applied a population growth factor and assumptions about the

- timing and speed of shared mobility adoption and autonomous vehicles' availability and adoption based on historical adoption rates of other technologies and consensus views of the vehicles' commercial availability. To calculate auto finance in the new mobility ecosystem, we applied current breakdowns of the percentage of new and used vehicles financed to the future states, adjusting for assumed changes in vehicle life and price. Estimates should be considered preliminary and directional only. We plan on publishing a more fulsome description of our modeling efforts via Deloitte University Press.
16. Ibid.
  17. Jim Henry, "Go ahead, get a prearranged auto loan, dealerships say they like a challenge," *Forbes*, February 28, 2014, [www.forbes.com/sites/jimhenry/2014/02/28/go-ahead-get-a-prearranged-auto-loan-dealerships-say-they-like-a-challenge/](http://www.forbes.com/sites/jimhenry/2014/02/28/go-ahead-get-a-prearranged-auto-loan-dealerships-say-they-like-a-challenge/).
  18. *Subvention* refers to manufacturer-subsidized loans or leases.
  19. Dinsdale, Willigmann, Corwin, and Glueck, *The future of auto retailing*.
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